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(56) Documents Cited:  
US 6113281 A US 5982974 A  
US 5709459 A

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INT CL<sup>7</sup> A61B, F21V  
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(54) Abstract Title: Portable cold light lamp

(57) A portable cold light lamp (1) particularly suitable for use in the medical field, and capable of being worn on a person's head, comprises a housing (2) which comprises an optical head (3) for retaining at least one optical lens (5), an adapter part (6) for connecting the optical head (3) to an end piece (10) of a fibre-optic lightguide bundle (7) connected or connectable to a light source, the adapter part (6) including means (22) for attaching the lamp (1) to a wearable support means, wherein between the optical head (3) and the adapter part (6) there is provided a filter holder (9) for regulating the spectral distribution and light intensity of the illumination light from the light source. The filter holder may be a slide or a rotatable disc.

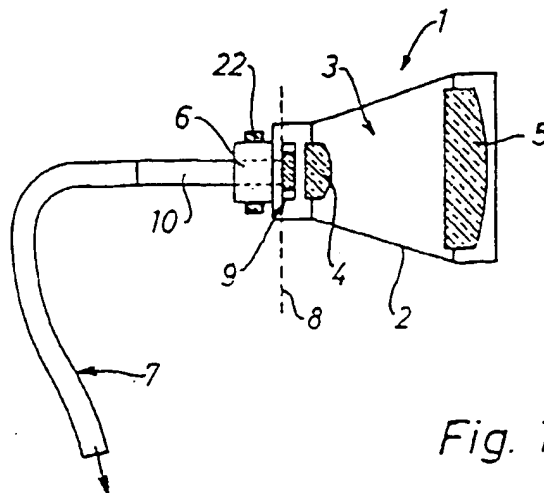


Fig. 1

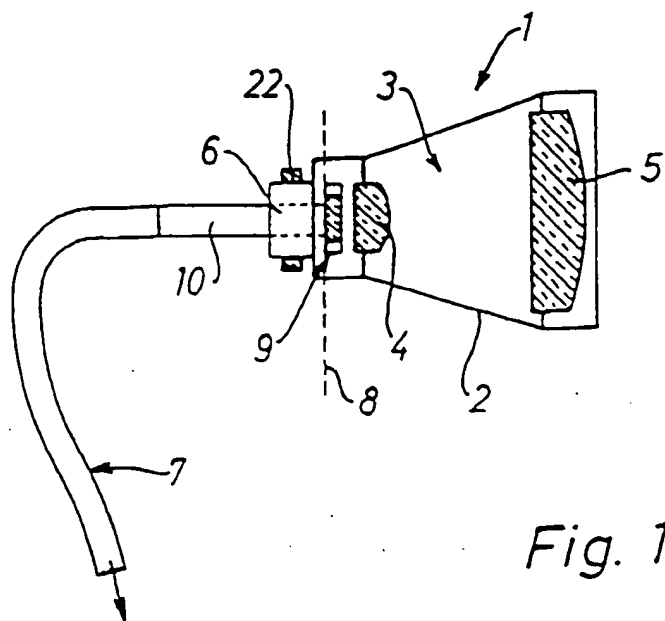


Fig. 1

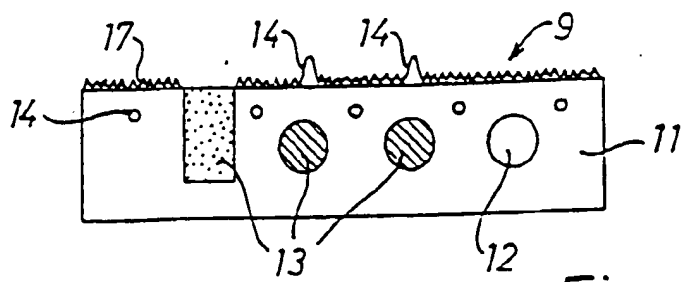


Fig. 2

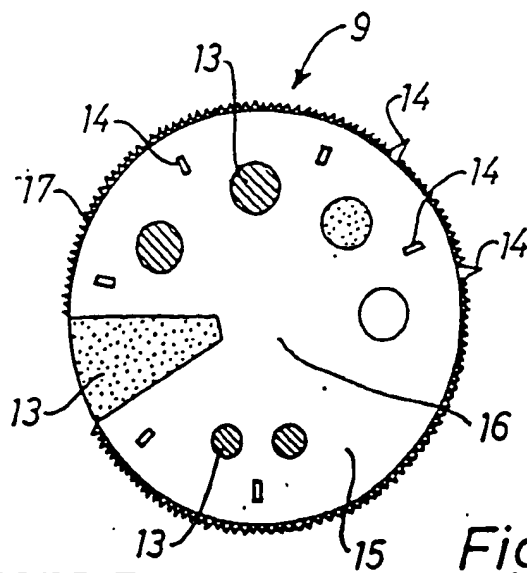


Fig. 3

## PORTABLE COLD LIGHT LAMP

The present invention concerns a portable cold light lamp particularly suitable for medical applications. Because the lamp is capable of being worn on a person's head,  
5 it will be referred to hereinafter as a "headlight".

Such headlights are essentially used in the medical field, because the use of hot light sources in the surgical field can lead to damage, especially to burns in the tissue of the area being operated. Cold light sources for this type of use essentially comprise a  
10 hot light source, whose light is directed via a fibre optic light guide to a light projecting element. A known headlight system is known, for example, from US 4,290,422. This headlight system comprises an illumination optic which is attached to a headband. The light for the illumination optic is generated in a remote station and is directed to the illumination optic by a fibre optic cable. This type of illumination  
15 system is essentially well proven in the medical field and is used, for example, in dental medicine or jaw surgery, gynaecology or otology.

It has been shown that it is not possible to satisfactorily regulate known cold light headlights. In particular, the operator is forced to face the light source station during  
20 the observation in order to make adjustments to the headlight. Modern light source stations not only permit an adjustment of the light intensity but also permit an exchange of colour filters. Thus, green filters are commonly used in surgery, because tissue with a heavy blood flow (circulation) is more easily recognisable, i.e. shows a stronger contrast, using green light. In dental medicine it is highly preferable to use  
25 yellow light for observing the field of operation, because by suppressing the blue component in the illumination light it is possible to avoid an untimely polymerisation of the light reactive composite material. In practice it has proven disadvantageous that these adjustments must be carried out at the light source station. Furthermore, those filter elements arranged nearby to the light source are subjected to extreme  
30 heat stress which, in time, is severely detrimental to the colour quality of these elements and shortens their lifespan. These known cold light headlights are also difficult to clean/sterilise as is required in the medical field.

It is therefore the object of the present invention to provide a regulatable cold light headlight which can be easily manipulated by the operator, in particular with regard to changing the illumination colour, and which does not have the drawbacks of known illumination systems.

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This object is solved according to the invention by means of a cold light headlight having the features of claim 1. In particular, this cold light headlight comprises a housing with an optical head for a first and a second lens, with a filter holder for regulating the intensity and spectral distribution of the illumination light, as well as  
10 with an adapter part for attaching the fibre-optical lightguide bundle to the housing on the one hand, and means for attaching the entire housing to a headband on the other hand.

In a preferred embodiment the filter holder comprises a slide having a plurality of  
15 apertures which are provided with different colour filters and/or which have differing aperture diameters. Instead of a slide it is also possible to provide a circular disk having a plurality of apertures.

Such a cold light headlight can be manipulated by the operator without requiring him  
20 to change his momentary viewing position. Furthermore, it is possible to easily insert a variety of differently configured filter holders, dependent upon the required field of activity or use. The modular construction of the inventive headlight also permits this to be easily taken apart and cleaned or sterilised.

25 In the following the invention shall be described in more detail with the aid of preferred embodiments and with the aid of the drawings.

Fig. 1 is a schematic view of a cold light headlight according to the invention;  
Fig. 2 is a first embodiment of a filter holder according to the invention; and  
30 Fig. 3 is a second embodiment of a filter holder according to the invention.

The cold light headlight 1 shown in Figure 1 comprises a housing 2 with an optical head 3. This optical head 3 bears a first lens 4 and a second lens 5, which are arranged in a known manner and are suitably dimensioned. An adapter part 6 permits a fibre-optical lightguide bundle 7 to be attached to the housing 2 in such a manner that the front end surface of the fibre-optical lightguide bundle 7 lies in the object plane 8 of the optical system defined by the two lenses. For this purpose, the lightguide bundle 7 is provided with an end piece 10 which is connectable with the adapter part 6 in a desired manner, and in particular is latchable thereto. The choice of geometric arrangement and size lies within the scope of the expert and is not subject of the present invention. The other end of the lightguide bundle is connected or connectable to a light source. The adapter part 6 is provided with means 22 for attaching the cold light headlight 1 to a headband. A filter holder 9 is arranged between the object plane 8 and the first lens 4. In the embodiment shown, this filter holder 9 is configured as a slide and can be manipulated from the exterior. In order to change the colour of the projected light the operator need only manipulate this slide. Suitable latching means secure this slide in its correct position. In a preferred embodiment, these latching means comprise a springy protuberance which latches into suitable recesses. The individual filter elements are arranged adjacent to each other in this slide and comprise at least a yellow filter for dental medicine and a green filter for tissue observation. It is to be understood that in this slide there is also provided an aperture for generating white light. The adapter part 6 comprises suitable attachment means 22 for attaching the cold light headlight 1 to a headband (not shown). These attachment means 22 can be designed so as to be able to swivel or pivot the cold light headlight 1 in relation to the headband. Preferably the headband is provided with suitable means to securely guide the fibre-optical lightguide bundle.

The filter holder 9 shown in Figure 2 is configured as a slide 11 and comprises a plurality of apertures 12. These apertures 12 can have different diameters and are provided with different colour filters 13. It is to be understood that at least one of the apertures 12 is not provided with a filter element in order to allow a white light illumination. These colour filters 13 comprise a yellow filter on the one hand, such as is used by the operator during dental operations in order to work on light-active

composite material without provoking a cross-linking reaction in this material. On the other hand a green filter is also provided, which serves to be better able to observe tissue having a strong blood circulation. When using green light the contrast in red-coloured objects is increased. This facilitates the observance of tissue having dissimilar blood circulation which, in turn, facilitates the recognition of diseased tissue. It is to be understood that the choice of the individual filters 13 is adapted to the characteristics of the light source and to the individual requirements. With the arrangement according to the present invention it is possible to change the filter holder 9 to fulfil the respective needs. The slide 11 shown in Figure 2 comprises latching means 14 comprising semi-spherical or semi-cylindrical recesses. The expert will select suitable latching means 14 for correctly positioning the filters 13.

Figure 3 shows a filter holder 9 which is designed as a circular disk 15. The colour filters 13 are circularly arranged around a pivotal axis 16 and can be either round or sector-shaped. The circular disk 15 can have a serrated or structured edge 17 in order to facilitate turning of the same by the operator. The latching means 14 can be arranged on the surface or at the periphery 18 of the circular disk 15.

Further developments of the cold light headlight 1 according to the present invention lie within the scope of the expert. In particular, the filter holder 9 can be operated by means of an electromotor, electromagnet or electronically and in particular can be remote-controlled. It is to be understood that the inventive cold light headlight 1 can also be provided with sensors which, for example, can detect the stability of the light intensity and light distribution. The inventive cold light headlight 1 can be used not only in human medicine but also in veterinary medicine or in fine mechanics such as in the manufacture of watches or of jewellery. It is to be understood that the cold light headlight 1 can also be attached to glasses, microscopes or similar portable observation instruments.

## CLAIMS

1. A portable cold light lamp particularly suitable for use in the medical field, and capable of being worn on a person's head, which lamp (1) comprising a housing (2) which comprises an optical head (3) for retaining at least one optical lens (5), an adapter part (6) for connecting the optical head (3) to an end piece (10) of a fibre-optic lightguide bundle (7) connected or connectable to a light source, the adapter part (6) including means (22) for attaching the lamp (1) to a wearable support means, wherein between the optical head (3) and the adapter part (6) there is provided a filter holder (9) for regulating the spectral distribution and light intensity of the illumination light from the light source.
2. A lamp as claimed in claim 1, wherein the filter holder (9) is designed as a slide (11).
3. A lamp as claimed in claim 1, wherein the filter holder (9) is designed as a circular disk (15).
4. A lamp as claimed in one of claims 1 to 3, wherein the filter holder (9) comprises a plurality of apertures (12) which are provided with colour filters.
5. A lamp as claimed in claim 4, wherein at least one aperture (12) is provided with a yellow filter.
6. A lamp as claimed in claim 4, wherein at least one aperture (12) is provided with a green filter.
7. A lamp as claimed in one of claims 1 to 6, wherein the filter holder (9) is provided with latching means (14).
8. A lamp as claimed in claim 7, wherein the latching means (14) are arranged on the surface of the filter holder (9).

9. A lamp as claimed in claim 7, wherein the latching means (14) are arranged at the periphery (18) of the filter holder (9).
10. A lamp as claimed in one of the preceding claims, wherein the filter  
holder (9) can be operated by remote control.
11. A lamp as claimed in any one of the preceding claims wherein the wearable support means is a head band.
- 10 12. A lamp as claimed in claim 1 substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.

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Claims searched: 1-12

Examiner: Colin Clarke  
Date of search: 28 January 2003

## Patents Act 1977 : Search Report under Section 17

### Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance	
Y	1,3-9,11 at least	US 6113281	DAVIS figs 1 & 3 and column 4 line 44 to column 5 line 16
Y	1,3-9,11 at least	US 5982974	DAVIS figs & column 3 lines 13-53
Y	1,3-9,11 at least	US 5709459	COGENT LIGHT fig 1

### Categories:

X Document indicating lack of novelty or inventive step	A Document indicating technological background and/or state of the art
Y Document indicating lack of inventive step if combined with one or more other documents of same category	P Document published on or after the declared priority date but before the filing date of this invention
& Member of the same patent family	E Patent document published on or after, but with priority date earlier than, the filing date of this application

### Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC<sup>v</sup>:

F4R

Worldwide search of patent documents classified in the following areas of the IPC<sup>7</sup>:

F21V,A61B

The following online and other databases have been used in the preparation of this search report:

WPI, EPODOC, JAPIO